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EXAMINER

STORM, DONALD L

ART UNIT	PAPER NUMBER
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2654

DATE MAILED: 07/16/2003

5

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/529,384

Applicant(s)

HOVELL ET AL

Examiner

Donald L. Storm

Art Unit

2654

V

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 April 2000.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 April 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The PRELIMINARY AMENDMENT, filed April 13, 2000 (paper 3), has been entered.

Information Disclosure Statement

2. A copy of the International Search Report (Form PCT/ISA/210) and the copies of the documents are present in the application file, and they have been considered by the Examiner. The listing of references in the Search Report is not considered to be an information disclosure statement (IDS) complying with 37 CFR 1.98. The MPEP 609 A(1) states, "the list ... must be submitted on a separate paper." To have the references printed on any patent resulting from this application, a separate listing, preferably on a PTO-1449 form, must be filed within the set period for reply to this Office action.

3. A copy of the International Preliminary Examination Report (Form PCT/IPEA/409) and the copies of the documents are present in the application file, and they have been considered by the Examiner.

Specification

4. The title is objected to because it is not sufficiently descriptive of the invention. A new title is required that is clearly indicative of the invention to which the claims are directed. See MPEP § 606.01. The Examiner suggests that the Applicant consider a title including these elements: "Pattern Recognition with Criterion for Output from Selected Model to Trigger Succeeding Models."

5. The specification is objected to under 37 CFR 1.84(p)(5) because using reference characters in the description that are not shown in the drawings introduces confusion. Appropriate correction is required. The description includes at least the following reference sign(s) that are not shown in the drawings: control unit 7 (page 10, line 31); network 4 (page 15, line 2).

6. The Examiner notes, without objection, the possibility of informalities in the specification. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. The Applicant's cooperation is requested to consider correcting minor errors of which the Applicant may become aware during normal review and revision of the disclosure.

At page 12, line 15, did the Applicant intend to point to Figure 10 for the network of numerals, rather than "Figure 6"?

7. The Examiner notes, without objection, that this application is informal in the arrangement of the specification. The following guidelines illustrate the preferred layout and content for patent applications, and items should appear in upper case, without underlining or bold type, as section headings. It is in the best interests of the patent community that the Applicant be aware of these editorial situations and consider changes during normal review and revision of the disclosure.

In current Office practice, explained in MPEP § 608.01(a), the specification should contain:

Title of the Invention:
specification,
Reference to compact disc
Background of the Invention:

at the top of the first page of the
see 37 CFR 1.52(e)(5)
two parts,

Field of the Invention: may also be titled "Technical Field,"
Description of the Related Art: may also be titled "Background Art,"
Brief Summary of the Invention:
Brief Description of the Drawings:
Detailed Description of the Invention:
Claim or Claims: commence on separate sheet, each
element or step of the claim should be separated by a line indentation; there
may be plural indentations to further segregate subcombinations or related
steps,
Abstract of the Disclosure: on a separate sheet, narrative of the claimed matter.

Claim Informalities

8. Claim 1, and by dependency claims 2-14, are objected to under 37 CFR 1.75(a) because the meaning of the phrase "the associated subset members" needs clarification. Because no associated subset or associated members were previously recited, it is unclear as to what element this phrase is making reference. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phrase to refer to --subset members--.
9. Claim 4 is objected to under 37 CFR 1.75(a) because it does not end with a period. Each claim begins with a capital letter and ends with a period to avoid undue confusion in determining if the claim is complete. Appropriate correction is required. See MPEP § 608.01(m).
10. Claim 11, and by dependency claims 13 and 14, are objected to as failing to define the invention with the clarity required by 37 CFR 1.75(a). The claim is confusing because the method set forth in the preamble is not carried out by the recited claim elements inherited from claim 1; the preamble to claim 11 sets forth speech recognition. The claim is unclear because no speech signal is recited and no connection between speech and the pattern recognition method is recited, but claim 1 is able to stand alone. Thus, the body of the claim is unconnected to the speech

recognition set forth in preamble. Is the scope of claim 11 somehow further limited by an unrelated functionality that includes speech recognition? Note that the vocalisation models of claim 12 connect speech (that is, vocalizing) to the input data sub-sequence.

11. Claim 15 is objected to for the same reasons as claim 1 because the limitations are recited using obviously similar phrases.

12. Claim 15 is objected to as failing to define the invention with the clarity required by 37 CFR 1.75(a). The claim describes adding further models in terms of its characteristic, purpose, or capability. That is, the adding (step) has the purpose to reduce recognition time. The phrase “to thereby reduce” raises a question or doubt as to whether the feature introduced by such language is (a) merely a purpose or field of use for adding, and therefore not required, or (b) a required feature of the claim. It is not clearly set forth whether an adding step that does not achieve the purpose of reducing recognition time is within the scope of the claim, or whether the claim is met if and only if recognition time is reduced. The Applicant may wish to consider if that limitation recites the claimed subject matter that the Applicant wants, because steps of a process should clearly recite method steps defined as steps, and not as characteristic, purpose, or description.

13. Claim 16, and by dependency claims 17-26, are objected to for the same reasons as claim 1 because the limitations are recited using obviously similar phrases.

14. Claim 19 is objected to under 37 CFR 1.75(a) because it does not end with a period. Each claim begins with a capital letter and ends with a period to avoid undue confusion in determining if the claim is complete. Appropriate correction is required. See MPEP § 608.01(m).

15. Claim 23 is objected to for the same reasons as claim 11 because the limitations are recited using obviously similar phrases.

16. Claims 9, 12, and 21 are objected to because of potentially confusing informalities.

a. In claim 9, line 2, is a word or phrase missing from the phrase “output that are not selected”? Is there a grammar mismatch between singular and plural number?

b. In claim 12, line 1, plural noun subject “models” does not agree in number with the singular verb “comprises”.

c. In claim 21, line 2, should the word “is” be --if--?

17. The Examiner notes, without objection, the possibility of informalities in the claims. The Applicant may wish to consider changes during normal review and revision of the disclosure.

In claim 25, lines 1-2, is the word “performing” unnecessary in the phrase “comprising performing an apparatus”?

18. The form of the claims does not follow Office practice. While there is no set statutory form for claims, the present Office practice is to insist that each claim must be the object of a sentence starting with “I (or we) claim”, “The invention claimed is”, or the equivalent. The Applicant is encouraged to insert a desired introduction before claim 1. If, at the time of

allowance, appropriate terminology is not present, it is inserted by the technical staff. See MPEP § 608.01(m).

Claim Rejections - 35 USC § 102

19. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Klovstad

20. Claims 1-7, 11-12, and 15-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Klovstad [US Patent 4,718,092].

21. Regarding claim 16, Klovstad [at title] describes speech pattern recognition and the claimed limitations recognizable to one versed in the art as the following elements:

means for generating and applying data, selecting model output, and adding models [at column 3, lines 31-column 4, lines 43, as process control circuitry, microprocessor, memory, and software programs];

generating a data sequence representative of a physical entity [at column 4, lines 45-48, as process audio input to provide a set of parameters characterizing input speech];

applying the sequence to a set of models [at column 4, lines 52-60, as compare the vector of acoustic parameters to reference templates];

active models are used [at column 16, lines 9-10, as “active” kernels are processed];

in a network of models [at column 15, line 42, as graph form of models transformed into a lattice];

the set includes at least one model [at column 16, lines 64-65, as the first kernel is not made inactive];

selecting a subset of the outputs of the members of the set according to a predetermined criterion [at column 15, line 63-column 16, line 16, as choose the template likelihood score which maximizes probability and deactivate those less than a minimum score];

add models to the set dependent on the members of the subset [at column 16, lines 22-25, as make the next kernel active if the score of the last active kernel is less than some threshold];

each model represents a subpattern [at column 14, lines 15-16 and 44-45, as elementary units (kernels) that are grouped into words];

the model in use outputs an indication of the degree of matching between an input sub-sequence and the represented sub-pattern [at column 15, line 63-column 16, line 2, as the dynamic programming employing the template computes conditional probability of the speech unit corresponding to the template]; and

the further models take subset members as inputs [at column 16, lines 45-47, as the “seed score” for (the first node of a kernel) is inherited from the preceding kernel].

22. Regarding claim 17, Klovstad also describes:

the further model is only added if it is not already in the set [at column 16, lines 22-25, as the next inactive kernel is made active if not active].

23. Regarding claim 18, Klovstad also describes:

the applying is element-by-element [at column 16, lines 9-12, as each "active" kernel is processed]; and

the selection is performed between applications of successive sequence elements [at column 15, lines 59-63, as find the optimal path at each row in the lattice].

24. Regarding claim 19, Klovstad also describes:

the model as a finite state network [at column 14, lines 16-23, as the elementary units of speech (acoustic kernels) considers a Markov model].

25. Regarding claim 20, Klovstad also describes:

means for assessing the values for each state of the members and deactivating states that do not meet a predetermined criterion [at column 16, lines 3-29, as dynamic programming for computations and minimum score comparison to predetermined threshold and deactivating the word if the minimum score is greater than the threshold, for each "active" kernel at the time frame]; and

assess between applications of successive data sequences [at column 15, lines 59-63, as find the optimal path at each row in the lattice].

26. Regarding claim 21, Klovstad also describes:

a model is removed if all its states have been deactivated [at column 17, lines 23-30, as all nodes that concatenate words in the past and in the further past are deleted recursively from the set which can be used].

27. Regarding claim 22, Klovstad also describes:

the criterion applied to model outputs is harsher than the criterion applied within models [at column 16, lines 26-29, as the score that determines the end is better than the score at any intermediate node].

28. Regarding claim 23, Klovstad also describes:

speech recognition [at column 15, lines 11-12, as the method is implemented for speech recognition].

29. Regarding claim 24, Klovstad also describes:

the models are subword vocalizations [at column 18, lines 9-26, as templates of acoustic kernels, for example 10 for a word, result from an utterance].

30. Claims 1-4 set forth a method with limitations comprising the functionality associated with using the system recited in claims 16-19. Because Klovstad describes the similar limitations as indicated there, these claims thus are anticipated accordingly.

31. Claim 5 sets forth a method with limitations comprising the functionality associated with using the system recited in claim 20. Because Klovstad describes the similar limitations as indicated there, this claim thus is anticipated accordingly, where assessing the values for each state satisfies assessing each state.

32. Claim 6 sets forth a method with limitations comprising the functionality associated with using the system recited in claim 21. Because Klovstad describes the similar limitations as indicated there, this claim thus is anticipated accordingly, if the Examiner's assumptions that establish clarity for the limitations are correct, as described elsewhere in this Office action.

33. Claim 7 sets forth a method with limitations comprising the functionality associated with using the system recited in claim 22. Because Klovstad describes the similar limitations as indicated there, this claim thus is anticipated accordingly.

34. Claims 11-12 set forth a method with limitations comprising the functionality associated with using the system recited in claims 23-24. Because Klovstad describes the similar limitations as indicated there, these claims thus are anticipated accordingly.

35. Claim 15 sets forth limitations similar to claim 1. Klovstad describes the limitations as indicated there, where adding to reduce the time required to recognize the pattern is inherent in the adding. Admission of this inherency is found in the specification of the application at page 5, lines 14-25, which points out that the method comprising adding further members to the set independence on members of the subset to thereby reduce the time required to recognize the pattern clearly provides the effect that the recognition is performed more quickly.

Claim Rejections - 35 USC § 103

36. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Klovstad and Tsuji

37. Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Klovstad [US Patent 4,718,092] in view of Tsuji et al. [US Patent 4,601,057].

38. Regarding claim 8, Klovstad describes model outputs and selecting the high-probability output from matches to reference templates and deactivating others that do not meet predetermined criteria during dynamic programming as indicated for claim 1, with reference to claim 16.

Klovstad's thresholds are predetermined. Klovstad does not explicitly describe how to determine the threshold. In particular, Klovstad does not explicitly teach constructing and using a histogram of the model outputs to determine the best likelihood outputs and to determine those kernels to be deactivated.

Tsuji [at abstract] describes pattern analysis that requires discriminating between two conditions based on values that describe the conditions.

create a histogram on the basis of the values [at column 4, lines 18-28, as form a histogram in correspondence to grades of the signal];

select those values in the bins of the histograms which contain outputs having the best m values [at column 4, lines 63-65, as consider those points in grades above the threshold value];

integer number m of values is selected [at column 4, lines 20-23, as grades are 256 {Exmr:integer} storing areas].

Tsuji describes a problem in the area of pattern recognition that is similar to one encountered by Klovstad. Klovstad discriminates by predetermining two thresholds. Tsuji describes another solution, and it would have been obvious to one of ordinary skill in the art of classification of patterns at the time of invention to apply Tsuji's concepts to Klovstad's problem of selecting those outputs which contain the best values on the one hand, and selecting those states having the best values for deactivation on the other hand, because Klovstad's decisions make a two-category classification problem, and Tsuji describes how to improve the grounds for making such a decision..

39. Regarding claim 9, Klovstad also describes

outputs are selected by setting outputs that are not selected to a predetermined value [at column 16, lines 5-25, as nodes that are not activated, included in all nodes, were set to an initial maximum].

40. Regarding claim 10, Klovstad describes model outputs and selecting the high-probability output from matches to reference templates and deactivating others that do not meet predetermined criteria during dynamic programming as indicated for claim 1, with reference to claim 16.

Klovstad's thresholds are predetermined. Klovstad does not explicitly describe how to determine the thresholds. In particular, Klovstad does not explicitly teach constructing and using a histogram of the model outputs to determine the best likelihood outputs and to determine those kernels to be deactivated.

Tsuji [at abstract] describes pattern analysis that requires discriminating between two conditions based on values that describe the conditions.

create a histogram on the basis of the values [at column 4, lines 18-28, as form a histogram in correspondence to grades of the signal];

select those values in the bins of the histograms which contain outputs having the best n values [at column 4, lines 63-65, as consider those points in grades above the threshold value];

integer number n of values is selected [at column 4, lines 20-23, as grades are 256 {Exmr:integer} storing areas].

Tsuji describes a problem in the area of pattern recognition that is similar to one encountered by Klovstad. Klovstad discriminates by predetermining two thresholds. Tsuji describes another solution, and it would have been obvious to one of ordinary skill in the art of classification of patterns at the time of invention to apply Tsuji's concepts to Klovstad's problem of selecting those outputs which contain the best values on the one hand, and selecting those states having the best values for deactivation on the other hand, because Klovstad's decisions make a two-category classification problem, and Tsuji describes how to improve the grounds for making such a decision..

Klovstad and O'Brien

41. Claims 13-14 and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Klovstad [US Patent 4,718,092] in view of O'Brien [US Patent 5,479,489].

42. Regarding claim 25, Klovstad describes an apparatus as indicated for claim 23. Klovstad [at column 1, line 65-column 2, line 9] also points out that the apparatus improves various aspects of speech recognition over other equipment.

However, Klovstad does not list particular embodiments of the other equipment. In particular, Klovstad does not explicitly describe a speech synthesizer apparatus for generating a speech signal.

O'Brien [at column 3, lines 28-35] describes equipment for generating a speech signal from text recognized from an utterance. O'Brien describes:

an apparatus for generating a speech signal and a speech synthesizer [at column 3, lines 34-36, as a text to speech converter that converts a character string to speech]; and

its operation is dependent on operation of the speech recognition apparatus [at column 2, lines 34-36, as the text to speech converter announces text translated from an utterance by an automatic speech recognition unit].

Because O'Brien's speech output first depends on the output of a speech recognizer, it would have been obvious to one of ordinary skill in the art of speech recognition at the time of invention to include Klovstad's apparatus for speech recognition with O'Brien because O'Brien does not require any particular speech recognition functionality and Klovstad points out an apparatus that provides accurate, reliable, reasonably priced speech recognition, and is easily trained.

43. Regarding claim 26, Klovstad describes an apparatus as indicated for claim 23. Klovstad [at column 1, line 65-column 2, line 9] also points out that the apparatus improves various aspects of speech recognition over other equipment.

However, Klovstad does not list particular embodiments of the other equipment. In particular, Klovstad does not explicitly describe a telephone network and switching center.

O'Brien [at column 2, lines 33-59] describes equipment for connecting a call through a telephone switch in response to recognized speech. O'Brien describes:

a telephone network apparatus and a telephone switching centre [at column 3, lines 33-39, as the PSTN and a local switch];

it establishes a telephone connection dependent on operation of the speech recognition apparatus [at column 2, lines 34-59, as the local switch establishes a connection to the telephone number obtained from a speech recognition unit's translation between an utterance and a telephone number].

Because O'Brien's telephone connection operation depends on the output of a speech recognizer, it would have been obvious to one of ordinary skill in the art of speech recognition at the time of invention to include Klovstad's apparatus for speech recognition with O'Brien because O'Brien does not require any particular speech recognition functionality and Klovstad points out an apparatus that provides accurate, reliable, reasonably priced speech recognition, and is easily trained.

44. Claim 13 sets forth a method with limitations comprising the functionality associated with using the system recited in claim 25. Because Klovstad and O'Brien describe and make obvious the similar limitations as indicated there, this claim thus is unpatentable accordingly.

45. Claim 14 sets forth a method with limitations comprising the functionality associated with using the system recited in claim 26. Because Klovstad and O'Brien describe and make obvious the similar limitations as indicated there, this claim thus is unpatentable accordingly.

Conclusion

46. The following references here made of record are considered pertinent to applicant's disclosure:

Sherwood et al. [US Patent 6,163,768] identifies a subset of the recognition vocabulary for expansion to actual words, then deactivates states based on a threshold that is less strict than the speech recognition word threshold.

Chung et al. [US Patent 6,278,973] describes speech recognition with cascaded network models that adds states and arcs to recognition paths that remain after pruning states and arcs that lie beyond a predetermined value.

47. Any response to this action should be mailed to:

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

or faxed to:

(703) 872-9314, (for formal communications intended for entry)


Or:

(703) 872-9314, (for informal or draft communications, and please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA (Sixth Floor, Receptionist)

48. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donald L. Storm, of Art Unit 2654, whose telephone number is (703)305-3941. The examiner can normally be reached on weekdays between 8:00 AM and 4:30 PM Eastern Time. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha D. Banks-Harold can be reached on (703)305-4379. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office at telephone number (703)306-0377.

July 11, 2003


Donald L. Storm
Patent Examiner
Art Unit 2654